



Fisheries and Oceans Canada Pêches et Océans Canada

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April 24, 2017

Your file *Votre référence*
EA1415-01

Our file *Notre référence*
15-HCAA-01626

Mackenzie Valley Environmental Impact Review Board
Attention: Mark Cliffe-Phillips, Executive Director
200 Scotia Centre
Box 938, 5102-50th Ave.
Yellowknife, NT X1A 2N7

Email: mcliffephillips@reviewboard.ca

Subject: Meeting Record: Fisheries and Oceans Canada – Parks Canada Agency – Canadian Zinc Corporation, March 7, 2017

A meeting between Fisheries and Oceans Canada (DFO), Parks Canada Agency (PCA), and Canadian Zinc Corporation (CZN) was held on March 7, 2017. Attached is a record of this meeting.

If there are questions regarding the meeting record, please contact Jessica Taylor by mail at Jessica.Taylor@dfo-mpo.gc.ca or by phone at 867-669-4927.

Sincerely,

Véronique D'Amours-Gauthier
Senior Fisheries Protection Biologist
Central & Arctic Region
Fisheries and Oceans Canada

ATTACHMENT: DFO-PCA-CZN-TT Meeting Record, March 7, 2017_signed

cc. Jessica Taylor, DFO – Yellowknife
 Allison Stoddart, Parks Canada Agency
 Cavan Harpur, Parks Canada Agency
 Jacquie Bastick, Parks Canada Agency
 David Harpley, Canadian Zinc Corporation
 Bill Rozeboom, Tetra Tech

Canada

MEETING RECORD

Date/Time:	March 7, 2017 / 9 am MST
DFO Attendees:	Jessica Taylor, Elizabeth Patreau
PCA Attendees:	Allison Stoddart, Cavan Harpur, Jacquie Bastick
CZN Attendees:	David Harpley
Tetra Tech (for CZN):	Bill Rozeboom

Issues Discussed:

Meeting Minutes taken by Jessica Taylor.

-Jess introduced the call: thanks everyone, the purpose of this call is to ask more questions regarding the hydrology of Sundog Creek specifically for the realignment. Previous discussions took place during a February 17th meeting and Bill reviewed the meeting minutes and had some very informative comments.

Bill, not sure if you want to take over from here?

-Bill: most of my comments were about the apparent misunderstanding of groundwater. In Sundog Creek, the groundwater is not separate or buried like it is in other systems; there are no discrete springs, its recharge coming from the watershed. It's the hydraulics of the aquifer.

-upper watershed runoff, goes to recharge local aquifer which is all stocked in alluvium, when surface water declines, what maintains the flow, is the slow release of water coming out of the alluvium

-referring to sketch: this is not separate groundwater system, it is more just water ponds into gravel adjacent to the stream

-Sundog Creek is wide long channel of lots of gravel that holds water

-Allison: the present stream has groundwater component under the stream – question: does that underground component include the area underneath where the proposed realignment is going to go?

-Bill: rather than thinking of an underground component, there is water in the ground, that water is barely moving (it's just water, more of a pool or a lake, not moving just sitting there, the flowing water is in the surface, seepage is coming from out of the sides into the surface water), yes there's groundwater beneath the stream bed but it's just sitting there

-Cavan: you've indicated that the water in the alluvium is primarily recharged from surface water upstream, so the current channel has water (surface water) going through it. The area with the proposed realignment doesn't have surface water, so does the area underneath, is it also being recharged....is there a level of....

-Bill: it will receive the same recharge. When the realignment occurs, the cumulated water upstream, new channel - old flow path. Recharge and discharge will be the same functionally as what's occurring in the existing channel

-Cavan: will that happen right away?

-Bill: pretty much immediately: this work is going to be done in the dry when there's no flow

-Jess: will the alluvium/gravel bed – if there's currently not a lot of water underground, will it absorb a lot of surface flow at first?

-Bill: it will be saturated the same as the current one is. After no flow for several months, alluvium dries out, water table on the sides falls, no longer keeping the channel wet, which is that reach is dry in aerial photos

-Dave: yes, that's what Bill's illustrating in his top picture

-Allison: different from existing channel?

-Dave or Bill: No.

-existing channel has gone through fall and winter period where there's been discharge, in essence, the two channels are more or less identical, whether flows in either channel, wetting up, loss of surface water

into alluvium

-Dave: Cavan's question of flow downstream in the new channel: there is a tributary that comes off the northern slope off the valley and intersects downstream. If that's the flow you're referring to it's from the tributary

-subsurface flow in the tributary

-surface expression goes dry, change in elevation

-Bill: Sundog creek 300m, it's an immense expanse geological period stream. We're not changing the volume of that. The channel's ability to soak water, release water, is unchanged – remains the same

-when the whole system is dry across the board, at some point you have flow coming through the system,

-Allison: when the whole system is dry, in your opinion is the water table level the same under the current stream bed and the proposed stream bed?

-Bill: They should be the same because what we're doing with the replacement or realignment is we're taking the end points and matching those in the proposed channel and making it deep enough so it has equivalent capacity and equivalent depths. These channels are dynamic. Process of recharge and release back into the channel should be the same as existing conditions, we're not doing anything different, storage should remain unchanged, hydrology from the upper basin, should behave the same. The location where recharge and discharge occurs in the future new location

-seepage: water you see in these channels is the accumulation of everything upstream. For example, 99% of water is going to be in new channel, declining flows, accumulation from upstream it's not just this reach

-breaking up over phone

-rise and fall under alluvium

-Jess asked Bill to repeat last part because phone line was breaking up.

-Bill: a summary statement would be - there is strong evidence that timing of flows and flows in new channel will be the same in existing channel.

-Jess: so the groundwater is the same in the existing channel and the proposed channel?

-Bill: yes

-Cavan: for the offsetting pool that was proposed by John at the end of the diversion, originally we thought there would be a flow maintaining it but it's more of a seepage flow to maintain that pool

-Cavan: will you be modelling to confirm winter depth? How deep do you have to dig that pool?

-Dave: it's has to be deep enough so it's comfortably deep enough in the winter groundwater table

-Cavan: how will you determine what the depth should be?

-Dave: I think we're going to have to basically dig a sufficient depth for example if we install this in late fall/early winter (when the water table is lower), I think the elevation of when we hit water at that time would be an indication of how far we need to go

-have to allow for further drop at that point

-e.g. 2m below water table, would be 3m below point of water

-Cavan: so it will be an on-site determination for depth?

-Dave: I think so, that's probably the best way to do it

-Cavan: TetraTech august 10th figure 5 and 6 which had 2 year and 100 year showing flows in existing channel, 9 and 10 show 2 and 100 year post-realignment

-flows coming in from the northern tributary and before the realignment, the colours are different there as well, I don't understand why they're different when no changes have occurred

-Bill: I don't have the figures in front of me so speaking from memory – these runs we're done in two separate periods and the scale bar may be different

-Cavan: the colour scale for velocity is the same

-Cavan to send document out after this call to ask for confirmation

-Bill: are there any other questions?

-[long pause]

-Cavan: I don't have any other questions at this time

-Jess: I don't have any other questions but I'm still trying to wrap my head around how this works

-Bill: the processes are just continuing but shifts to the new channel. If you understand how the existing channel works, it's the same. Some of the nuances will depend on the particular flood but the interchange between water and ground will continue in the new location. If you can follow how the existing channel is working – it's the same in the new channel

-Jess: I don't really understand how the existing channel works

-Bill described an example from a previous work experience in British Columbia (correction from Bill:

southern Alberta), where there was a river and a headwater reservoir, they had to determine when water from the reservoir would reach downstream portions of the river, and how much water would reach downstream portions of the river. It turned out that less water reached downstream compared to what was released at the reservoir, so there were losses. It turned out that riparian vegetation such as willows and dogwoods were up taking water in some of riparian areas, through their roots. In the Sundog system, there isn't really vegetation like in the BC example, so any losses are just going back into the creek like in the sketches.

-Jess: ok thanks. So any losses in the creek are just going back into the creek like in the discharge sketch example?

-Bill: yes

-Jess: okay I have no other questions. Thank you.

Follow-up emails:

From: Rozeboom, Bill [mailto:Bill.Rozeboom@tetrattech.com]

Sent: March-07-17 10:46 AM

To: cavan.harpur@pc.gc.ca; david@canadianzinc.com

Cc: Taylor, Jessica E; Patreau, Elizabeth; Allison.Stoddart@pc.gc.ca; jacquie.bastick@pc.gc.ca; D'Amours-Gauthier, Veronique

Subject: RE: Flow model figures

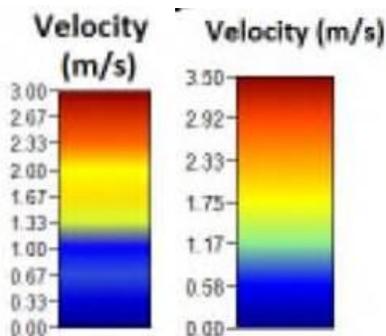
Cavan,

I can confirm that the visual difference in the pairs of figures is due to different scale bars.

Model runs for Figures 5 and 6 for existing conditions used a velocity scale bar for the range 0 to 3.0 m/s. Model runs made at a later date to produce Figures 9 and 10 for the preliminary design used a velocity scale bar for the range 0 to 3.5 m/s. I had noticed this as well when preparing the report, which is why I mentioned on the call that this was the probable cause of your comment.

Thanks,

Bill



W.A. (Bill) Rozeboom, MBA, PE, PEng | Principal Specialist – Water Resources

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From: cavan.harpur@pc.gc.ca [mailto:cavan.harpur@pc.gc.ca]

Sent: Tuesday, March 07, 2017 10:12 AM

To: Rozeboom, Bill <Bill.Rozeboom@tetrattech.com>; david@canadianzinc.com

Cc: Jessica.Taylor@dfo-mpo.gc.ca; Elizabeth.Patreau@dfo-mpo.gc.ca; Allison.Stoddart@pc.gc.ca; jacquie.bastick@pc.gc.ca; Veronique.DAmours-Gauthier@dfo-mpo.gc.ca

Subject: Flow model figures

Hi Bill,

The figures I was referring to were from a Tetra Tech EBA document, file Y1410332-0, dated Aug 10, 2016 (attached below). Comparing figure 5, Sundog Creek Existing Geometry 2-year Inundation Limits and Flow Velocities, to figure 9, Sundog Creek Preliminary Design 2-year Inundation Limits and Flow Velocities, and figure 6, Sundog Creek Existing Geometry 100-year Inundation Limits and Flow Velocities, to figure 10 Sundog Creek Preliminary Design 100-year Inundation Limits and Flow Velocities, it seems the flow velocities above the Sundog diversion and the tributary from the north after the diversion differ between the existing and realigned channel although nothing should have changed here. This may be as David suggested, due differences in scale bar colouring being used between the existing and preliminary designs if all model parameters were the same, but if you could confirm that would be appreciated as it is difficult to tell. Thanks.

Cheers,

Cavan Harpur
Ecologist, Fathom Five National Marine Park and Bruce Peninsula National Park
Parks Canada / Government of Canada
248 Big Tub Rd., Box 189, Tobermory, Ontario N0H 2R0
cavan.harpur@pc.gc.ca / Tel: 519-596-2444 x. 321 / Cell: 226-668-0608

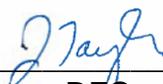
Ecologiste, Parc marin national Fathom Five et Parc national de la Péninsule-Bruce
Parcs Canada / Gouvernement du Canada
248 chemin Big Tub, C.P. 189, Tobermory, Ontario N0H 2R0
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Time to Connect | Un bon temps pour se rapprocher

Signature of Parties Confirming Accuracy of Record:

Jessica Taylor

Name



Signature - DFO

Cavan Harpur

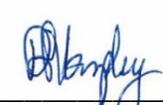
Name



Signature - PCA

David Harpley

Name



Signature - CZN

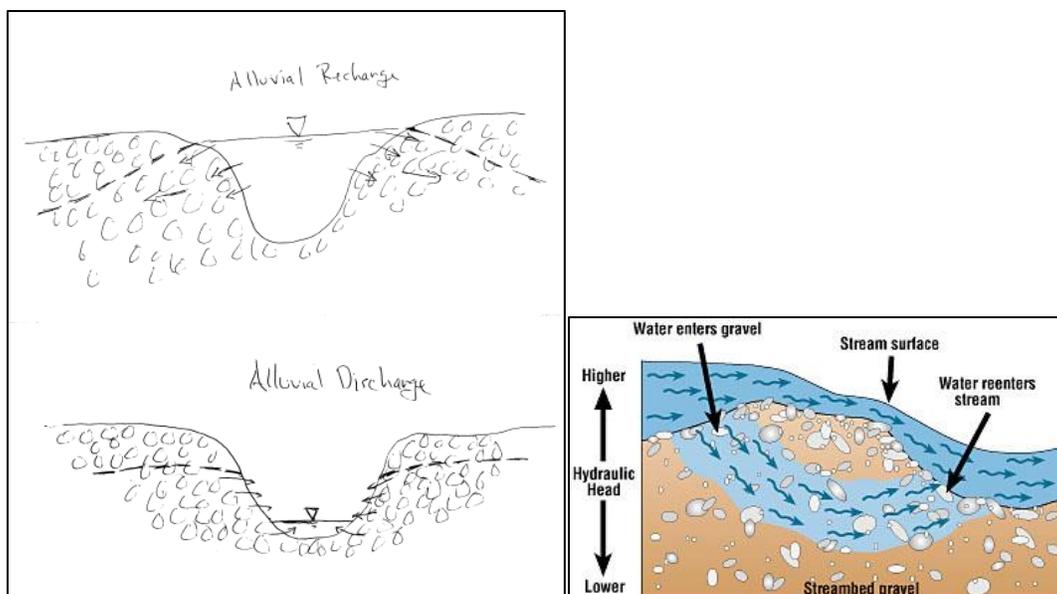


Fig. 1 (left): Correct example, Fig. 2 (right): Incorrect example. See email exchange below.

From: Taylor, Jessica E [<mailto:Jessica.Taylor@dfo-mpo.gc.ca>]

Sent: Tuesday, March 07, 2017 8:44 AM

To: Patreau, Elizabeth <Elizabeth.Patreau@dfo-mpo.gc.ca>; 'cavan.harpur@pc.gc.ca' <cavan.harpur@pc.gc.ca>; Allison.Stoddart@pc.gc.ca

Cc: Rozeboom, Bill <Bill.Rozeboom@tetrattech.com>; D'Amours-Gauthier, Veronique <Veronique.DAmours-Gauthier@dfo-mpo.gc.ca>

Subject: FW: questions in advance of Tuesday's call

Hi Liz, Cavan, Allison,

Just wanted to share these two diagrams in advance of this morning's call. Please see Bill's email below.

Thanks,
Jess

Jessica Taylor

Fisheries Protection Biologist | Biologiste de Protection des Pêches
Fisheries Protection Program | Programme de Protection des Pêches
Fisheries and Oceans Canada | Pêches et Océans Canada
Central and Arctic Region | Région du Centre et de l'Arctique
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Email | Courriel: Jessica.Taylor@dfo-mpo.gc.ca

From: Rozeboom, Bill [<mailto:Bill.Rozeboom@tetrattech.com>]

Sent: March-04-17 9:14 AM

To: Taylor, Jessica E

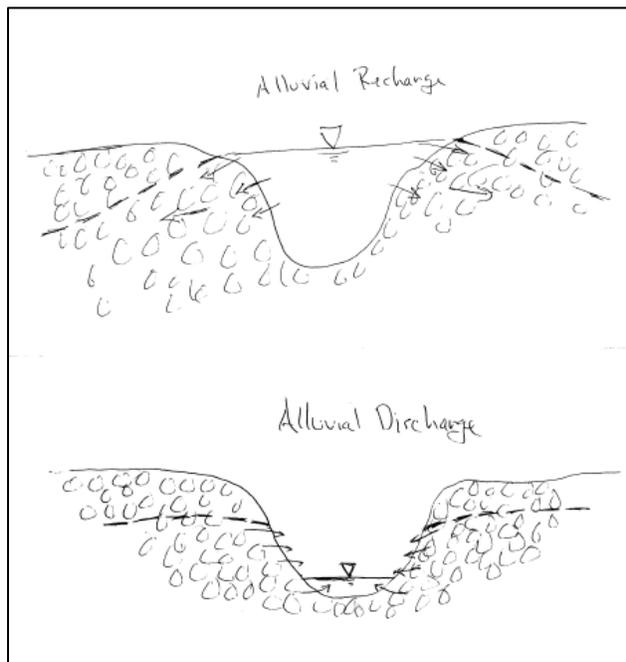
Cc: David Harpley

Subject: Fw: questions in advance of Tuesday's call

Hi Jess,

I have attached a sketch (pdf document) to illustrate my interpretation of how the hyporheic zone exchanges along Sundog Ck are most likely to occur.

The jpg picture/cartoon diagram you provided does not portray what is going on. We can discuss further on Tuesday.



Thanks,
Bill R

From: Taylor, Jessica E <Jessica.Taylor@dfo-mpo.gc.ca>

Sent: March 2, 2017 2:48 PM

To: Rozeboom, Bill

Subject: questions in advance of Tuesday's call

Hi Bill,

Thank you for agreeing to have a call with us on Tuesday regarding the hydrology of Sundog Creek. I took some time the other day to read more about the hyporheic zone and how it might work in Sundog Creek. I'm a visual learner, so does this attached picture/cartoon diagram portray an accurate example of the conditions in Sundog Creek?

The proposed berm will divert surface water, so subsurface water will daylight ("re-enter stream" as in the attached diagram) in certain locations downstream, and the amount of water will change depending on seasonal variation in flow(?). For Tuesday's call, I'm hoping to gain a better understanding of the hyporheic/subsurface flow in the existing main channel, what the interactions are like in the secondary/overflow channel (to be excavated), and anticipated conditions for post-realignment.

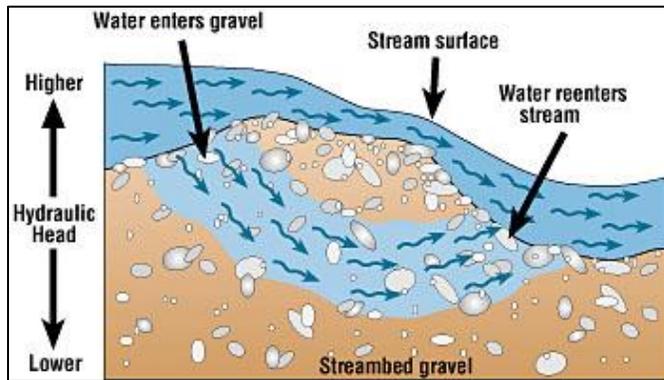


Image from Google

Thanks,

Jess

Jessica Taylor

Fisheries Protection Biologist | Biologiste de Protection des Pêches
Fisheries Protection Program | Programme de Protection des Pêches
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